



REPORT OF SURVEY CONDUCTED AT

**U.S. COAST GUARD, MAINTENANCE
AND LOGISTICS COMMAND-PACIFIC
ALAMEDA, CA**

MAY 2002



Best Manufacturing Practices

1998 Award Winner



INNOVATIONS IN AMERICAN GOVERNMENT

**BEST MANUFACTURING PRACTICES CENTER OF EXCELLENCE
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Foreword



This report was produced by the Office of Naval Research's Best Manufacturing Practices (BMP) Program, a unique industry and government cooperative technology transfer effort that improves the competitiveness of America's industrial base both here and abroad. Our main goal at BMP is to increase the quality, reliability, and maintainability of goods produced by American firms. The primary objective toward this goal is simple: to identify best practices, document them, and then encourage industry and government to share information about them.

The BMP Program set out in 1985 to help businesses by identifying, researching, and promoting exceptional manufacturing practices, methods, and procedures in design, test, production, facilities, logistics, and management – all areas which are highlighted in the Department of Defense's 4245.7-M, *Transition from Development to Production* manual. By fostering the sharing of information across industry lines, BMP has become a resource in helping companies identify their weak areas and examine how other companies have improved similar situations. This sharing of ideas allows companies to learn from others' attempts and to avoid costly and time-consuming duplication.

BMP identifies and documents best practices by conducting in-depth, voluntary surveys such as this one at the U.S. Coast Guard, Maintenance and Logistics Command-Pacific (MLCPAC), Alameda, California, conducted during the week of May 20, 2002. Teams of BMP experts work hand-in-hand on-site with the company to examine existing practices, uncover best practices, and identify areas for even better practices.

The final survey report, which details the findings, is distributed electronically and in hard copy to thousands of representatives from industry, government, and academia throughout the U.S. and Canada – *so the knowledge can be shared*. BMP also distributes this information through several interactive services which include CD-ROMs and a World Wide Web Home Page located on the Internet at <http://www.bmpcoe.org>. The actual exchange of detailed data is between companies at their discretion.

MLCPAC's responsibilities include availabilities, casualty responses, preventive maintenance, and technical and logistics support. The Command's Naval Engineering Support Units are located in Seattle, Washington, Alameda and San Diego, California, and Honolulu, Hawaii where it serves area and district cutters, boats, groups, and program managers. Among the best examples were MLCPAC's accomplishments in Contract Administration Workbooks, Cutter Class Maintenance Plans, Long Range Maintenance Plans, and the Quick Chit Process.

The BMP Program is committed to strengthening the U.S. industrial base. Survey findings in reports such as this one on the Maintenance and Logistics Command-Pacific expand BMP's contribution toward its goal of a stronger, more competitive, globally-minded, and environmentally-conscious American industrial program.

I encourage your participation and use of this unique resource.

A handwritten signature in black ink that reads "Anne Marie T. SuPrise".

Anne Marie T. SuPrise, Ph.D.

Director, Best Manufacturing Practices

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Section 1

Report Summary

Background

Located within the Department of Transportation, the U.S. Coast Guard is unique as an armed force, a military, multi-mission, maritime service that has answered the calls of America continuously for over 209 years. Comprised of active duty, reserve, civilian, and auxiliary personnel, it provides a broad range of services to the American people in times of peace and war. The Coast Guard's five operating goals — Safety, Protection of Natural Resources, Mobility, Maritime Security, and National Defense — define the focus of its mission and enable it to touch everyone in the United States. The U.S. Coast Guard is “Semper Paratus” — Always Ready — to fulfill its goals of protecting America's safety, security, environment, and economy. Over its history, the U.S. Coast Guard's roles as lifesavers and guardians of the sea have remained constant, while its missions have evolved and expanded with a growing nation. Throughout its mission areas, the U.S. Coast Guard believes its greatest strength lies in its people. Coast Guard men and women are a highly motivated group of people who are committed to providing essential and valuable services to the American public.

The U.S. Coast Guard, Maintenance and Logistics Command-Pacific (MLCPAC), located in Alameda, California, is the focus of this Best Manufacturing Practices survey report. MLCPAC's responsibilities include availabilities, casualty responses, preventive maintenance, and technical and logistics support. The Command's Naval Engineering Support Units are located in Seattle, Washington; Alameda and San Diego, California; and Honolulu, Hawaii where it serves area and district cutters, boats, groups, and program managers. In a typical workyear, MLCPAC may perform 24 commercial drydock availabilities, 20 commercial dockside availabilities, 1,000 casualty report response actions, 122,000 hours of preventive maintenance, and answer 26,000 cutter technical questions. Customer satisfaction is an essential part of MLCPAC's management focus, having won the 1999 Lucas Plaque for outstanding contribution to the Coast Guard Naval Engineering Program, and the 2000 Performance Achiever in the Commandant's Quality Per-

formance Challenge. MLCPAC's successes include a 3.93 on a scale of five for post availability scores, a 95% readiness average, and a 4.68 on a scale of five for its Naval Engineering Support Unit customer satisfaction. With its mission to provide the Coast Guard Pacific Fleet the most materiel readiness for every dollar and resource hour expended, MLCPAC is regarded service-wide as the best provider of materiel readiness and logistics in the Coast Guard.

This survey was conducted in conjunction with the Continuous Improvement of Drydocking Management project of the Gulf Coast Region Maritime Technology Center. The BMP Survey Team observed the dedication of MLCPAC personnel in accomplishing their mission, and considers the practices in this report to be among the best in government and industry.

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Section 2

Best Practices

Production

Environmental Programs for Pacific Area Cutters

The Maintenance and Logistics Command-Pacific has been successfully implementing various projects and programs for the protection of the environment.

The Maintenance and Logistics Command-Pacific (MLCPAC) has been successfully implementing various environmental programs and projects for Pacific Area Cutters in three categories: Work Practices, Pollution Prevention, and Compliance Training.

One of the Work Practices projects is MLCPAC's Topside Maintenance Project, which has two main goals: development of environmentally sound topside work procedures, and the investigation of the use of new technology and best management practices for tools, containment systems, and procedures. Project deliverables include the development of a step-by-step procedure, bills of material, paint float, containment drawings, and a vacuum tooling survey. It was concluded that a hand-held rotopeen (a rotating paint removal tool) and needle gun were best for low emissions. In addition, deliverables included a paint float containment redesign for paint removal of freeboard surfaces which focused on modifying a paint float design to include containment with aprons in the bottom that swing up to the hull. This design has wings that are attached to the ship via a series of magnets (Figure 2-1) and has an area for a diesel-operated vacuum ventilation system that removes 100% of the paint dust. As a result of this project, vacuum tooling and partial containments now result in near zero emissions from paint removal operations.

In the Pollution Prevention category, MLCPAC established Hazardous Materials Minimization (HAZMIN) Centers at Integrated Support Commands approximately 10 years ago. These HAZMIN Centers, located in Kodiak and Ketchikan, Alaska; Honolulu, Hawaii; and Seattle, Washington, are similar to a pharmacy of hazardous materials. If a cutter requires the use of hazardous materials in degreasing, the chemicals are taken from the HAZMIN Center, used as needed, and the unused hazardous material is returned to the HAZMIN Center. As a result, the cutters do not carry excess hazardous material on board which could turn into hazardous waste, and other cutters can use the balance of the hazardous material.

As part of its Compliance Training project, MLCPAC developed Unit Environmental Guides (UEGs). The UEGs provide afloat units with an overview of environmental protocols and cutters with best management practices to achieve environmental compliance. UEGs focus information to each cutter's operation and area of responsibility, and all UEGs are listed on MLCPAC's environmental web



Figure 2-1. Ship in Tarp

site as an interactive document. To date, 44 cutter visits, where personnel are briefed on environmental compliance, have been completed, and 44 UEGs issued. Ten cutter UEGs are funded through FY02, and all cutters will have UEGs by the end of FY03. MLCPAC also completed a video on opacity compliance, "Stack Emission Opacity Training." This nine-minute video provides smoke density pictures for cutters and is distributed to all Pacific area cutters.

Management

Availability Process

The Maintenance and Logistics Command-Pacific's Availability Team process reduced problems encountered during ship availabilities, while ensuring that work packages or specifications are complete and depict all work that is scheduled to be performed. By having all interested parties involved in the Availability Team process, fewer chances of mistakes or omissions occur, reducing cutter non-availability days.

The availability strategy and planning process being used by the Maintenance and Logistics Command-Pacific (MLCPAC) help ensure a smooth transition of ships to either drydock or dockside for routine and planned repairs and maintenance. The process begins approximately one year in advance of the actual repair event, and involves a team of players from all required disciplines involved in the drydocking and facilitates the overall availability scheduling process.

MLCPAC assembles an Integrated Product Team, called the A-Team. This Team consists of the type desk manager, who is the chairperson of the team; an engineering specifications writer (Spec Lead); the port engineer (PE) from one of MLCPAC's Naval Engineering Support Units (NESUs); and the contracting officer. Other ad-hoc members are added to the Team as required. Team members join or withdraw from the Team as their expertise is required, and may serve on several A-Teams simultaneously.

The A-Team process begins with MLCPAC notifying the affected cutter and NESU of the upcoming availability. A work definition conference is held between the NESU PE and cutter personnel to

generate the initial work list that depicts needed and desired repairs/modifications. After review and required modifications of this initial list by the type desk manager, the first A-Team meeting is held to define the scope of work, validate the acquisition strategy, deliver the work package for specification draft development, and finalize the worklist. A checklist has been developed to guide the participants through the process to ensure that nothing significant is overlooked.

The Spec Lead team member will then work with the other members of the specification branch to prepare a first draft of the specification and submit it to the entire A-Team for review and comment. A thorough review of the draft specification is one of the most important steps in the entire Availability Process. Team members forward their comments to the Spec Lead for review and concurrence. After approval, the Spec Lead combines all of the comments. The type desk manager schedules the second A-Team meeting, which is usually held aboard the vessel and involves a detailed review of the specification and a "shipcheck" to ensure that all necessary areas are covered. A checklist is again used to ensure the accuracy and completeness of the final specification. From this meeting, the final specification (or statement of work) evolves which is forwarded to contracting for start of the procurement process.

Execution of the contract is monitored daily by the NESU PE. Minor modifications to the contract are usually handled by the PE, who serves as the Contracting Officers Technical Representative. This review and partnering with the contractor by a member of the A-Team help ensure compliance to the contractual requirements and identify other areas of concern early, allowing for speedy contract modifications should the need arise.

At the conclusion of the contract execution, a third meeting is usually held between select members of the A-Team. This meeting is to solicit feedback from all members of the team and the customer, review lessons learned on this particular availability, and uncover ways to improve the entire process for future work. By having team members focus on a common goal and not just their part of the entire process, the A-Team makes a significant contribution to keep projects on schedule and within budget.

Contract Administration Workbooks

The Maintenance and Logistics Command-Pacific deployed an Excel-based workbook using a Citrix server with Intranet access which facilitates the sharing of current data by all Availability Process Team members and reduces redundant data entry.

The Maintenance and Logistics Command-Pacific (MLCPAC) conducts 24 drydock and 20 dockside availabilities per year. For these availabilities, each member of the Acquisition Team (A-Team) needs to share the same information. Prior to January 2000, A-Team members were making redundant data entries and faxing paper work. Unless an A-Team member was the recipient of the fax, the other team members were unaware of the fax. A-Team members also needed to be notified of approval/settlement of Work Requests.

To address these needs, an Excel Workbook was developed. It began as a paired set linked across a trusted domain. However, MLCPAC experienced problems in keeping the links working, and there was no access to the domain from the cutter homeport or the drydock facility. The Seattle and Honolulu offices were able to access their files, which were about 2MB in size, but downloading the files in their entirety was a problem. A Citrix Server with Intranet access was implemented in October 2001 and deployed in January 2002, and the workbooks were consolidated into one which eliminated the need to download the file in its entirety. One person at a time can modify the file while others can access read-only files. When someone finishes modification, other users are notified and can then resume their modifications if needed.

The new Workbook provides an innovative procedure to quickly modify existing contracts, has multiple sheets, and enables one-time data entry. The various cells throughout the Workbook are color-coded as to who is responsible to enter data, and provides several automated reports such as Metrics (Availability Performance Index), Final Cost, Modification Summary, and Weekly Progress. The Workbook's 28 tabs also include milestones and checklists, government furnished equipment tracking, bid abstracts, and work requests.

Cutter Class Maintenance Plan

The Maintenance and Logistics Command-Pacific developed a consolidated Cutter Class Maintenance Plan that gives the Command the visibility and flexibility needed to perform consistent and effective maintenance on U.S. Coast Guard cutters. This plan allows for better decision making, planning, and budgeting of maintenance functions and dollars.

The U.S. Coast Guard is faced with many problems in keeping its fleet underway in today's environment. Decreasing funding, an aging fleet, increasing fleet complexity, increasing environmental costs, and fleet inexperience are just some of the problems being faced. In an effort to overcome some of these restrictions, the Engineering Division of the Maintenance and Logistics Command-Pacific (MLCPAC) took on an ambitious effort to standardize the maintenance plans for all cutters within a given class and like equipment on various classes. This standardized maintenance plan not only affects the cutters within the Command but within the entire U.S. Coast Guard.

Previous to this undertaking, maintenance plans existed for each cutter, but were never consolidated into one centralized document that identified all of the maintenance requirements for hull, mechanical, and electrical systems on each cutter. Different levels of maintenance are required on each system and at different time intervals. Some maintenance items are purely unit (field) level items and are accomplished by the cutter crew, while other items are depot level and frequently contracted out to shipyards to perform. Typically, most maintenance was time based, and previous plans were not clear as to who performed each maintenance function. Shortcomings of the old system included over-maintaining some systems and under-maintaining others. The system did not encourage the most efficient or cost-effective maintenance means.

In 1999, MLCPAC organized all of its maintenance systems into Cutter Class Maintenance Plans (CCMPs). These CCMPs clearly spell out all of the details of the cutter class maintenance such as: the piece of equipment or system on the cutter; the component; work description; when to perform the maintenance (routine preventive maintenance by

cutter crew, drydock, or dockside); funding source for the maintenance; maintenance driver (time versus condition); and maintenance levels (organizational, intermediate, or depot).

This new system generates many benefits, and since 2001 is in use throughout both Coast Guard commands (MLCPAC and Maintenance and Logistics Command-Atlantic). With a common and consolidated maintenance plan, personnel moving from one coast to the other no longer have to adapt to differing maintenance philosophies. Maintenance is now more consistent and performed when necessary, not just because it is scheduled, enabling better budgeting of maintenance dollars. Visibility of maintenance requirements has increased since the database is available via the Coast Guard Intranet, clear lines of responsibility for maintenance functions are available, and centralized decision-making is now available on maintenance policies and procedures. The new CCMP is flexible, versatile, and meets the constantly changing needs of the Coast Guard.

Deployed Logistics Support

Without organic resources, the Maintenance and Logistics Command-Pacific developed a “one stop shopping” logistics support network. With the use of contractors and Husbanding Agents, the Coast Guard designed a Pacific Coast network where Coast Guard vessels can acquire needed fuel, parts, or services when needed without the use of a supply tender.

Without organic resources to support a fleet of ships in the Pacific Area, the Maintenance and Logistics Command-Pacific (MLCPAC) developed a “one stop shopping” logistics support network. The network consists of Husbanding Agents (HAs) and contractors that are stationed in the many ports that dot the western edge of the Pacific Ocean. When a cutter requires fuel, parts, or services, their needs are communicated to MLCPAC where the logistics support personnel manage the request by contacting an appropriate HA or contractor who fulfills the cutter’s logistics requirements.

The infrastructure implemented by MLCPAC is comprised of the latest information and communication technologies. Communication means such as cell phones, e-mail, personal digital assistants, and other similar devices are employed. When a cutter needs a part and is off the coast of Mexico, the cutter

issues a logistics request and communicates the request via an appropriate means to MLCPAC. MLCPAC logistics personnel receive the request, acquire the needed material or service, and then communicate how the appropriate HA or contractor acquires the material or service. MLCPAC then either ships the needed material or pays for the needed fuel or material. The HA or contractor then makes available the needed material or service to the requesting cutter.

MLCPAC developed this means of logistics support in FY2000 with the advent of communication technologies, and it has proved successful for the Pacific region because of the broad geographic area that defines this area of the world. In managing the system, MLCPAC has leveraged Navy contracts which provide for many HAs along the Pacific Coast and contracted with many contractors in foreign ports for port call fueling requirements. Transportation companies such as Federal Express are used to deliver needed parts to wherever a Coast Guard vessel is ported, and the newest available means of money transfers or credit card technology is also used. MLCPAC developed a program that offers the Coast Guard fleet a “one-stop shopping” logistics support system.

Long Range Maintenance Plans

With the use of new information technology, the Maintenance and Logistics Command-Pacific engineered a method to provide for long range planning of needed preventive maintenance activities.

As directed by several Coast Guard Engineering Manuals and an Internal Division Procedure, the Maintenance and Logistics Command-Pacific (MLCPAC) developed a process to produce Long Range Maintenance Plans (LRMPs) for every cutter within the Pacific Area. The LRMPs are specifically tailored for each cutter and are intended to forecast drydock and dockside availabilities; all major/special maintenance requirements; cyclic inspection/maintenance of major equipment/machinery; engineering changes; and other required maintenance activities.

The LRMP process begins with an MLCPAC Naval Engineering Support Unit (NESU) Port Engineer (PE) scheduling a cutter visit. The PE meets with key cutter personnel and reviews various data sources or inputs. In formulating the LRMP, the

NESU PE uses such input data sources as respective Cutter Class Maintenance Plans (CCMPs), Cutter Specific Maintenance Plans, Casualty Reports (CASREPs), Engineering Changes, Condition Based Maintenance (CBM) discrepancies, equipment operational hours, and other technical data. These data sources are then processed in accordance with derived algorithms and policies to provide appropriate maintenance plans and execution policies along with budget forecasts, which are captured in both the LRMP and the cutter's Naval Engineering Project Listing (NEPL). The resulting LRMP is reviewed and approved by the NESU Commanding Officer, then distributed to the cutter and various operational and supporting staffs, and placed on the Coast Guard Intranet website for use by the appropriate technical community.

The NESU uses two managing tools to assist in execution of the LRMP: (1) the LRMP Tracker, an MS Excel spreadsheet, which is maintained by the NESU and provides a means to track all planned maintenance actions, and (2) the LRMP Review Checklist, an internal list used by the NESU PE to ensure that comprehensive and consistent reviews are conducted. Each cutter's LRMP is updated annually for each cutter to meet MLCPAC's requirements of preparation 52 weeks prior to the availability start date and two weeks following the availability end date.

MLCPAC plans to further expand the usefulness of the LRMP by aligning it with other web-based tools and reports and transitioning it to an MS Access database-driven report.

Quick Chit Process

The Maintenance and Logistics Command-Pacific's Quick Chit Process is an innovative procedure to quickly cut through red tape and accomplish low-cost contract changes.

The Maintenance and Logistics Command-Pacific (MLCPAC) developed an innovative procedure, the Quick Chit Process, to quickly modify existing contracts. The Quick Chit Process provides a means to make a small dollar value (less than \$2,500) change to an existing contract by on-the-spot written agreements. The agreements are later incorporated into the contract file. Quick Chits are done under

authority delegated to the field officer (Port Engineer [PE]) who then negotiates the expected results with the contractor.

The Quick Chit Process takes into account the dynamic nature of ship repair and the high volume of changes. By using a controlled but expedited action, delays and disruptions are avoided, and senior, knowledgeable government authorizing officers are involved. The Quick Chit Process saves money and reduces resource utilization for the Coast Guard and its contractors, and is an improvement in time on the standard contract change process. Payments are still processed by invoice and paid through the U.S. Coast Guard Finance Office in Virginia.

Training Database

The Maintenance and Logistics Command-Pacific developed a software program that functions efficiently in keeping a complete division-wide training database.

An innovative Training Database has been developed to document all of the courses taken by members of the Maintenance and Logistics Command-Pacific (MLCPAC). This Training Database allows budget planning for new courses, management priorities for training, and tracks or incorporates expenditures by functional groups.

In 1994, MLCPAC developed a Training by Billet Plan which was followed by the development of a Master Training Plan in 1996/97. Beginning in 1998, the current Training Database evolved from multiple spreadsheets, and was completely revamped in 2002 to an MS Access database which provides the following functions:

- Identifies priorities for limited funds
- Maintains accurate training records for over 300 division personnel for individual and all-hands courses as well as on-the-job training
- Provides both billets and personnel histories
- Generates training transcripts and phone lists

With MLCPAC's new Intranet-integrated Training Database, record keeping is accurate, multiple spreadsheets and duplicate entries have been eliminated, greater value for training dollars has been achieved, and it has helped in the development of individual development plans.

Vessel Logistics System

As the needs and requirements of the Coast Guard logistics community evolved, the Maintenance and Logistics Command-Pacific met the challenge with the integration of three major Vessel Logistics Systems: the Fleet Logistics System, Configuration Management Plus, and the Supply Center Computer Replacement. The integrated system addresses the Coast Guard's requirements in the areas of configuration, maintenance, supply, and training management along with parts procurement management and technical support.

As the needs and requirements of the Coast Guard logistics community evolved, the Maintenance and Logistics Command-Pacific (MLCPAC) met the challenge and developed the Vessel Logistics System (VLS) by integrating three major systems: the Fleet Logistics System (FLS), Configuration Management Plus (CMplus), and the Supply Center Computer Replacement (SCCR). As shown in Figure 2-2, the heart of the VLS is the FLS which is the central database for the entire VLS and supports the maintenance business of the MLCs and their subunits. It also acts as the distribution point for all vessel

logistics information and is located at the Operations System Center. The system uses a visual basic user interface which is driven by an Oracle database. It has multiple applications linked to meet the original five functional areas of the FLS requirement: configuration management (CM), maintenance management (MM), supply management (SM), procurement management, and financial management. The FLS uses information from CMplus and SCCR to satisfy many of the needed requirements.

CMplus is a Coast Guard developed application built and maintained by the Department of Transportation, Volpe National Transportation System Center in Boston, MA and has three modules: Configuration Management (CM), Maintenance Management (MM), and Supply Management (SM). The CM module addresses configuration change requests; allowance change requests; configuration tracking; and parts removal. The MM module addresses corrective maintenance actions; shoreside maintenance projects; and hull and machinery history. The SM module addresses part ordering, receipt, and storage; hazardous material controls; and bar code usage.

The SCCR is an integrated provisioning, supply, inventory, procurement, and financial management

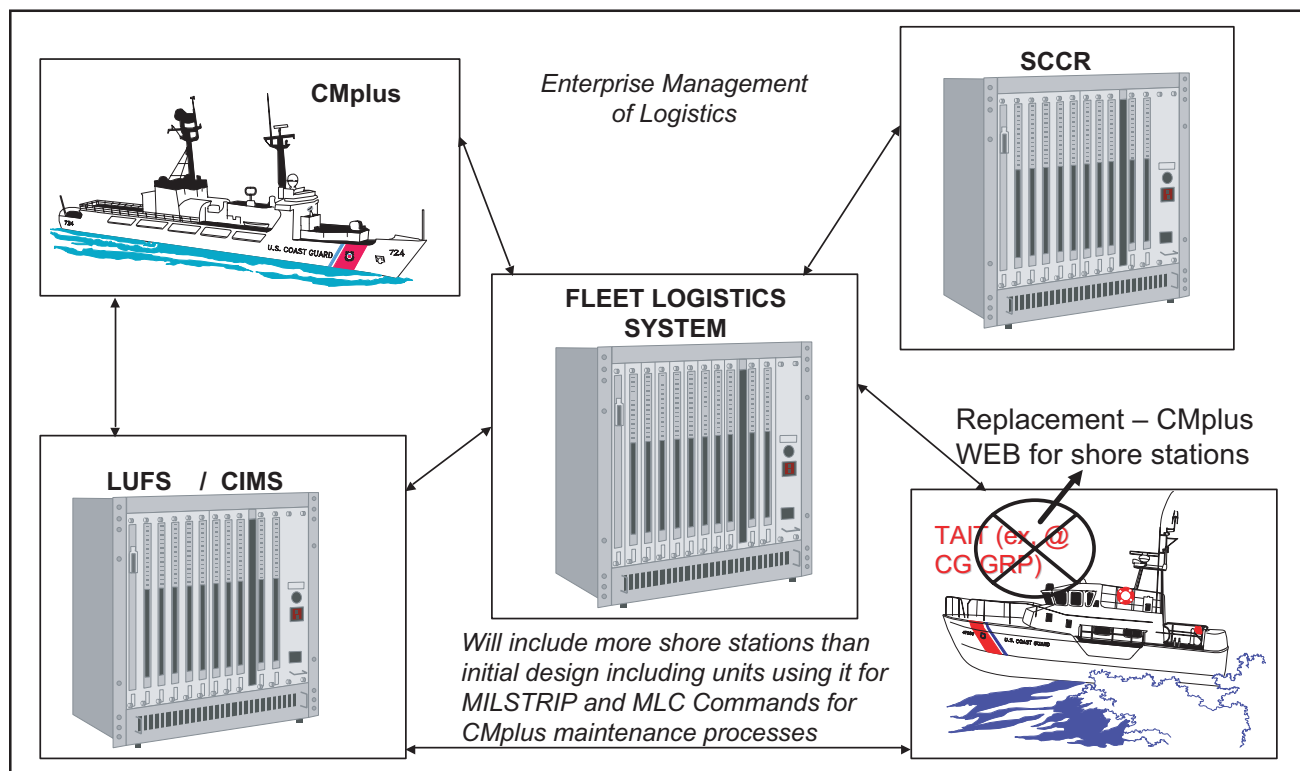


Figure 2-2. Vessel Logistics System

application for the Engineering Logistics Command and Coast Guard Yard. The SCCR module was developed under the FLS project to replace aging supply center computer hardware and serves as a foundation for the FLS. Figure 2-2 also shows a fourth system, Large Unit Financial System/ Contract Information Management System, which addresses financial information. The integration of this system into the VLS is making progress.

Top 10 Process

The Maintenance and Logistics Command-Pacific uses the Top 10 Process to identify top maintenance problems to support the prioritization of various improvement projects competing for various funds.

The Maintenance and Logistics Command-Pacific's (MLCPAC's) Top 10 Process is a formal process which identifies top maintenance problems and supports the prioritization of various improvement projects competing for various funds such as the Planned Obligation Program (POP) and Acquisition, Construction and Improvement. To develop the top 10 list, Casualty Reports (CASREPs), which are unplanned corrective maintenance activity reports, and Cutter Engineering Reports (CERs) are used. In addition, money and overall effects to operations associated with those casualties are analyzed. The Top 10 Process list includes title, discussion, recommended action, responsibility for action, resources which require the amount and the source of funding to be identified, and comments from the Maintenance and Logistics Command and Engineering Logistics Command.

The following steps comprise the Top 10 Process:

- Type Desk reviews CERs and CASREP data and compiles the preliminary Top 10 list
- MLCPAC reviews, approves, and prioritizes the Top 10 list and develops a top five list
- Type Desk Commander develops either a POP request, Engineering Change Request, or Planned Maintenance System change depending on the nature of the problem
- MLCPAC develops resource proposals
- Naval Engineering Maintenance Logistics Working Group reviews the POPs and resource proposals

In 2001, MLCPAC started the development of Top 5 Human Performance Issues. In addition, Top 10 and Top 5 prioritizations are being tied with POPs. A new standardized action plan is also under development which will include Reliability Centered Maintenance type review of each item as well as specific action items. Currently, Equipment Based Support Reviews are being conducted which include the manufacturer's technical representative and the best and brightest Coast Guard experts of the equipment under review. Maintenance policies, root causes of the problems, and improvement options will be discussed. In 2002, four Equipment Based Support Reviews will be conducted for davits, oily water separators, reverse osmosis units, and air conditioning and refrigeration units. The Top 10 Process resulted in the installation of incinerators on cutters in response to environmental concerns for plastic waste disposal. MLCPAC's Top 10 Process is an objective way of identifying and prioritizing top maintenance problems and supporting the prioritization of various improvement projects competing for various funds.

Section 3

Information

Production

Miniature/Microminiature Electronic Repair Program

The Maintenance and Logistics Command-Pacific has made significant use of the Miniature/Microminiature Electronic Repair program and expanded the usage to perform repairs on electronic circuit cards that normally would not be repaired, and also perform modifications to designs to alleviate design problems.

The Maintenance and Logistics Command-Pacific (MLCPAC) has utilized the Miniature/Microminiature (2M) Electronic Repair Program to perform repairs to electronic circuit cards. MLCPAC also expanded its use to circuit cards that normally would not have been considered repairable, and performed design modifications on some circuit cards to correct design deficiencies. The 2M Electronic Repair program provides the repair equipment, tools, techniques, and training required for electronic repair technicians to perform highly reliable, high quality repairs on complex circuit card assemblies. The 2M Electronic Repair program has saved money by avoiding costs associated with reliance on depot maintenance, and improved fleet readiness through the sustainability of equipment by on-site repairs. From 1997 through 2000, the Coast Guard documented a total cost avoidance of over \$4.5 Million.

One circuit card assembly had a design problem that caused the circuit card to fail to perform in its application. The circuit was susceptible to high frequency electrical noise. Since each cutter had different frequencies of noise, the design had to be adjustable for the different frequency responses. A redesigned circuit consisting of switchable filters was developed and added to the current design by the 2M Electronic Repair technicians, saving the cost of procuring a new design card.

Management

Condition Based Maintenance

The Maintenance and Logistics Command-Pacific implemented Condition Based Maintenance to optimize maintenance policies for approximately two-thirds of the cutters it operates.

In 1997, when repetitive failures were observed for critical equipment, a decision was made by the Maintenance and Logistics Command-Pacific (MLCPAC) to implement Condition Based Maintenance (CBM). CBM uses analytical and empirical data gained through non-invasive inspection to plan corrective and recurring maintenance. Machinery history is used to identify causes of failure that can be prevented. MLCPAC applies the following criteria to implement CBM for equipment selection; and pressure tests, thermography, lube oil analysis and vibration analysis are used:

Critical: Failure is catastrophic

Non-Critical but Important: Failure will cause a loss in mission capability

Non-Critical: Equipment failure is acceptable

Annual visits and in-port and underway surveys are conducted to assess equipment condition. A Vibration Test and Analysis Guide (VTAG) is used during these surveys, and thermal imaging surveys are also conducted. Based on these surveys, equipment condition detail reports are prepared and repair recommendations are made. CBM Reports also include a System Assessment Summary Graph (Figure 3-1) where the following material condition assessment codes are used:

EXCL: Performance at or near design; very minor discrepancies only

GOOD: Performance below design but acceptable; minor discrepancies allowed

FAIR: Performance marginal; minor moderate repairs may be recommended

POOR: Performance unsatisfactory; major repairs and overhaul needed

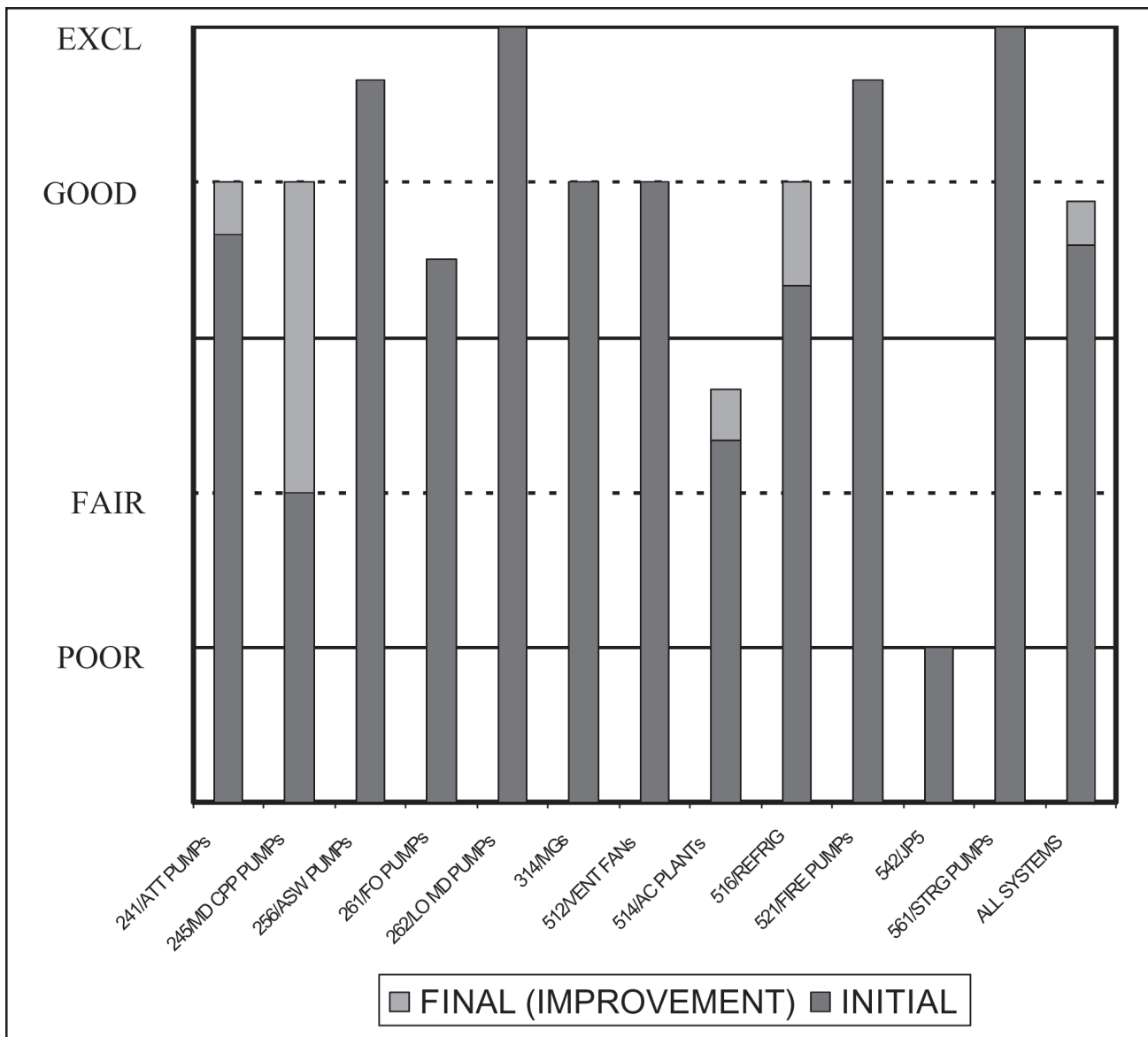


Figure 3-1. System Assessment Summary

OOC: Out of commission due to major discrepancies or overhaul in progress

OOS: Out of service due to support equipment problems or minor discrepancies

The use of CBM has increased machinery reliability, reduced maintenance costs, increased workforce effectiveness, avoided unnecessary maintenance, reduced Casualty Reports (CASREPs), and identified excessive and insufficient preventive maintenance actions. MLC PAC is currently moving to web-based reports with pre-generated Current Ship Maintenance Projects (CSMPs).

Configuration Management Plus

Configuration Management Plus is a Coast Guard developed application built to provide the fleet with information and support in the areas of configuration, maintenance, and supply management.

Configuration Management Plus (CMplus) is a Coast Guard developed application built and maintained by the Department of Transportation, Volpe National Transportation System Center in Boston, MA. The present system is DOS-like, as there are

no icons or mouse capabilities within the system. The fleet uses the system to manage and communicate logistics data to logistics personnel. The focus of CMplus is to support information on equipment configuration, maintenance status, and inventory. Logistics support personnel visit units on a predetermined schedule and identify supply problems, training deficiencies, and other fleet concerns. In providing support to scheduled vessels, communication can be conveyed by e-mail, telephone, or message traffic.

Fleet personnel acquire needed logistics information from three CMplus modules:

- Configuration Management (CM) module addresses configuration change requests, allowance change requests, configuration tracking, and parts removal.
- Maintenance Management (MM) module addresses preventive maintenance, corrective maintenance actions, shoreside maintenance projects, and hull and machinery history
- Supply Management (SM) module addresses part ordering, receipt, storage, and inventory management; HAZMAT controls; and bar code usage.

CMplus visits found several findings in its three modules. The present configuration status accounting of equipment in the fleet was inaccurate which adversely effected inventory levels. To resolve this issue, additional funding is being sought. Usage of the MM module increased substantially which was attributed primarily to the Naval Engineering Support Unit's (NESU's) involvement. In SM, inventory accuracy and storeroom conditions have improved.

Cutter Information Management

The Maintenance and Logistics Command-Pacific developed a plan and outline to produce computer files for all useful knowledge acquired on cutter maintenance.

The Maintenance and Logistics Command-Pacific (MLCPAC) developed a plan and outline to produce computer files for all useful knowledge acquired on cutter maintenance. In the previous filing system, each Type Desk maintained its own files without established guidelines as to format, content, duration, or filing procedures, and individual managers maintained their own discrete files. Information

was easily lost or misfiled, and file maintenance was getting in the way of cutter maintenance.

The new filing system ensures all files are located in a central location, is more comprehensive and structured, and incorporates information such as the cutter class, cutter (specific), technical class, technical general, contract administration (fleet/class), contract administration (cutter), project files, and engineering change files. MLCPAC's new filing system assures that the filing of information will be achieved uniformly across all Type Desks, filing locations are defined by subject, information is accessible by the entire staff, training time is reduced, and productivity increased.

Electronic Drawing Distribution

The Maintenance and Logistics Command-Pacific eliminated sending out paper drawing packages with their solicitations. Most vendors can now handle electronic formats and understand what equipment resources they must have. Significant cost savings have been realized in reduced manpower requirements and production costs.

Beginning in late 2000, the Maintenance and Logistics Command-Pacific (MLCPAC) began making the drawing packages it sends out with bid packages available in electronic format. Procurement documents such as solicitations were being sent out electronically, and the technology was already in place to create and disseminate electronic drawings. Therefore, it seemed logical to integrate the two processes.

Contractors and prospective contractors were contacted, and procedures to implement the process were developed. Initial response from contractors indicated the need for a Frequently Asked Questions area, and related answers were needed as part of the drawing package. This was incorporated into the process, and electronic drawings became part of MLCPAC's solicitations in 2001 on a regular basis.

With the Electronic Drawing Distribution system, the microfilming of drawings was eliminated and the creation of aperture cards was accomplished. The elimination of paper drawing packages saved over \$15,000 annually in reproduction costs, and significant manpower savings were realized.

Government Estimates

The tools used at the Maintenance and Logistics Command-Pacific to prepare government estimates allow an estimator to quickly and easily pull data from existing standards, historical estimates, and actual cost history. This data is used by engineering and management personnel to determine what, when, and how routine maintenance will be done and what maintenance will be deferred. This detailed estimate also allows the contracting officer to more thoroughly evaluate bids on contracted work.

The timely and accurate preparation of government estimates is critical to the process of selecting contractor(s) for the execution of work on Specifications (Coast Guard Statement of Work) or for depot level maintenance of their fleet. These estimates are used to evaluate potential bidders' proposals for fair and reasonable price in the execution of the desired work.

The Maintenance and Logistics Command-Pacific (MLCPAC) modernized and automated its estimating process to achieve more consistent methodologies using real standards. Prior to approximately late 1999, engineering personnel provided a one-page summary of the government estimate to the government Contracting Officer. This summary provided no supporting documentation to show how the estimate was determined or what was covered by the estimate. Consequently, the Contracting Officer often had difficulty in analyzing and justifying the government estimate.

The solution to this problem was to create an electronic government estimate workbook that allows a trained and experienced planner and estimator to prepare detailed and accurate estimates using established standards, historical estimates, actual cost history from previous contracts, and existing and new maintenance standards that were available in other databases. In developing the government estimate, the planner and estimator review the Long Range Maintenance Plan (LRMP) for a specific cutter that was to undergo drydocking or dockside maintenance, apply the pertinent work standards for the proposed maintenance items, and derive the preliminary cost estimate. Once the final specification or statement of work was negotiated and generated, the planner and estimator prepare the final government estimate based on the latest work content. This information is then reviewed by

appropriate personnel to determine if sufficient funds are in the budget to perform all of the specified maintenance. The final estimate is then forwarded to the Contracting Officer for his/her use in evaluating the bidder responses.

The workbook and all of the supporting data are now available on-line. Automated specification compilers allow the estimator to review each task in detail and apply the appropriate tasks and standards. The automated workbook is compatible with other existing workbooks, and provides contracting personnel with the level of detail they need as well as an easy-to-use tool for all concerned parties. A unique feature of this tool is its ability to change the total dollar amount of the estimate by changing the regional labor rate for the geographical area or region in which the contract will be placed.

Intranet Site

With the implementation of web technology, members of the Maintenance and Logistics Command-Pacific community who need information on a host of different topics, ranging from planned meetings and overhauls to how to procure diesel fuel, can find the answers on its new Intranet site.

The Maintenance and Logistics Command-Pacific (MLCPAC) developed, designed, and organized an Intranet Site that supported its mission requirements. The website provides information sharing with select Commands, aligns with the Maintenance and Logistics Command-Atlantic initiative, and allows for an open architecture for future expansion. By effectively implementing web technology, MLCPAC provides a host of vital information to those members in the Coast Guard community who need it the most.

The website's layout has a left/right frame construction. The left frame provides a search capability and nine general site overview headings, and the right frame is devoted to content information. At the top of the left frame, there is a search box where a customer can type in a word and a search routine will search the contents of the website and return all occurrences of that word or topic in the database in the right frame. Below the search box are nine general site overview topics. By clicking on any of these topics, further topics are revealed below (drop-down) the main topic. This drop-down capability is a good way to contain and group information within

a table-of-contents-like list. When any of the revealed left frame topics are clicked-on, the expanded version appears in the right frame.

The right frame provides an area showing an amplified version of the topics listed in the left frame. The main layout of the material presented in the right frame is highlighted at the top with bulleted information below. The bulleted information is hyperlinked text that allows the user to link to further amplifying information.

MLCPAC's Intranet website provides nine general information categories. The first general topic addresses general command overviews such as mission and vision statements, organizational charts, scheduled meetings and briefs, and strategies and metrics. The other eight main topics address Information Resource Management, useful links, platform support, procurement, Standard Operating Procedures, technical resources, and Naval Engineering Support Units (NESUs). With the development and continued evolution of the Intranet Site, vital information needed by the Coast Guard community can be easily accessed and used to support its vital mission. Other accessible information includes Long Range Maintenance Plans (LRMPs), Configuration Management (CM) data, Naval Engineering Project Listings, scheduled maintenance activities, Cutter Information Management System, procurement procedures, and essential topics needed by the entire Coast Guard community.

Library Project

The Maintenance and Logistics Command-Pacific revamped and cataloged its technical library to provide a well organized, easy-to-use, up-to-date source of technical publications and documents. The next step toward modernization and continued organization is to put the index on the Intranet Site allowing all personnel immediate access to the most current documents.

In mid 2000, the Maintenance and Logistics Command-Pacific (MLCPAC) recognized the need to organize, update, catalog, and modernize its technical library so that time would not be wasted in trying to locate and then ascertain the correctness of documents on hand. MLCPAC's library contained approximately 8,000 documents or pieces of information that are required by engineering and maintenance personnel to develop and maintain maintenance

plans and develop specifications or statements of work.

Accomplishing this task with contractor personnel proved to be more daunting than originally anticipated. The original goal was to have this effort accomplished by mid 2001. However, after starting the project, it quickly became evident that the schedule was too ambitious. Good processes and procedures, such as how to classify and code documents, had not been developed prior to starting the work, and were now required before the actual work could begin. Contractor personnel were generalists instead of technical specialists; therefore, they required intense MLCPAC personnel involvement that was not planned or budgeted.

As of May 2002, over 90% of the technical publications and documents have now been updated and cataloged. All documents are clearly labeled, have convenient centralized access, and are uniform in appearance. Labeling and organization goals have been met. The next step is to make the index available to all personnel via the Intranet Site, which will ensure that everyone spends less time looking for information, and the information will be current and up-to-date.

Quality Management Board

The Maintenance and Logistics Command-Pacific established a dynamic and productive management oversight group, a Quality Management Board, which provides the fleet with leadership and structure to implement the Command's mission and vision.

The Maintenance and Logistics Command-Pacific's (MLCPAC's) Quality Management Board (QMB) began in the late 1980s and has evolved as management missions changed. Currently, the QMB is comprised of Division Chiefs, Branch Chiefs, Naval Engineering Support Unit (NESU) Commanding Officers, and Senior Level Employees, and meets three to four times annually. The QMB is used to set strategic direction and goals, focus operation of the Command, improve metrics, and incorporate new technologies. The QMB's goals are categorized into five general areas: (1) maintain the fleet's hull, mechanical, electrical, and ordnance systems with maximum effectiveness and efficiency; (2) cheerfully manage customers' expectations all the time; (3) scrupulously follow and continuously improve key processes; (4) have a workplace where people want to work, and (5) have user-friendly information management systems

to let MLCPAC and its customers know what and when information is needed.

To measure the effectiveness of the QMB, certain metrics are applied. These metrics, which include financial performance; customer satisfaction; community; supplier, organizational, and operational performance; workforce; and innovation and technology, are part of the QMB's Strategic and Leadership Goals. MLCPAC has participated in and won several of the Commandant's Quality Awards which is attributable to the support of the QMB.

Specification Feedback

The Maintenance and Logistics Command-Pacific implemented an Access-based specification feedback database, which is accessible by the cutter and port engineers via a Citrix server. The information is searchable, and the process provides continuous improvement of specification baselines.

For some time, the Maintenance and Logistics Command-Pacific (MLCPAC) has been requesting specification feedback from the cutters. Previously, a 15-day feedback report was requested and required from the cutter on the Acquisition Team (A-Team) process, specification discrepancies, and contractor performance. Since no standard feedback format existed, a draft response was routed to other branch chiefs for chop/concurrence. Information was neither accessible nor searchable, and the response was sent back without the baseline specification being updated. A new Specification Feedback version was implemented in October 1999, has an Access-based specification feedback database, and implements the customer survey in electronic format. First, the cutter provides feedback to the port engineer (PE) at the Naval Engineering Support Unit (NESU). The PE then enters the information into the database within seven days of the end of the availability. MLCPAC's type desk manager then approves or rejects the recommendation of the cutter and/or the NESU. The specification lead verifies that the spec owner (subject matter expert) identified on the feedback is correct, then distributes the feedback, and the owner resolves the issues and updates the baseline specifications. The specification lead then presents the resolved feedback at the third A-Team meeting.

With MLCPAC's newest version (Mod 1) of the Specification Feedback process, the specification feedback database has been moved to a Citrix server. Now cutter personnel with Citrix access can gain access to specification feedback, and the PE is also able to access it either on board the cutter or at the NESU facility.

Support Contracts

Without organic resources in all Western Pacific Ports, the Maintenance and Logistics Command-Pacific developed a "one-stop shopping" logistics support network with contractors who have been used and provide quality services. With the use of Long Term Support Contracts, the Command found that support for Coast Guard vessels has improved.

In maintaining a deployed logistics system, the Maintenance and Logistics Command-Pacific (MLCPAC) used the concept of an on-going support contract. When a recurrent need is identified, MLCPAC uses Indefinite Delivery Indefinite Quantity (IDIQ) contracts, awarded on a best-value basis, to provide a long-term relationship with the contractor and reduce requirement identification for procurement cycle time. IDIQ contracts are long-term contracts defined as base year plus two to four optional year renewals against which delivery orders are issued. The contracts provide an annual minimum guarantee and maximum thresholds, generally defined in terms of a dollar amount. For the security of such a contract, MLCPAC requires either fixed price line items and/or a fixed labor rate. IDIQ contracts are used for several different materials and/or services such as integrated propulsion plan support, main diesel engine support, paint and preservation, janitorial services, topside painting, hub overhauls, and dive services.

MLCPAC realized several advantages from IDIQ contracts including consistent technical support for complex Coast Guard systems; reduced acquisition burden assumed by cutter crew; reduced acquisition cycle time for individual repair actions; and long-term business relationships with providers of quality services. With the use of IDIQ contracts, MLCPAC found that the right contractors can provide the fleet with the flexibility to rapidly order recurring work and improve the percentage of required maintenance the Command completes.

Appendix A

Table of Acronyms

ACRONYM	DEFINITION
2M	Miniature/Microminiature
A-Team	Acquisition Team
CASREP	Casualty Report
CBM	Condition Based Maintenance
CCMP	Cutter Class Maintenance Plan
CER	Cutter Engineering Report
CM	Configuration Management
CMplus	Configuration Management Plus
COTR	Contracting Officers Technical Representative
CSMP	Current Ship Maintenance Project
FLS	Fleet Logistics System
HA	Husbanding Agent
HAZMIN	Hazardous Materials Minimization
IDIQ	Indefinite Delivery Indefinite Quantity
LRMP	Long Range Maintenance Plan
MLCPAC	Maintenance and Logistics Command-Pacific
MM	Maintenance Management
NEPL	Naval Engineering Project Listing
NESU	Naval Engineering Support Unit
PE	Port Engineer
POP	Planned Obligation Program
QMB	Quality Management Board
SCCR	Supply Center Computer Replacement
SM	Supply Management
Spec Lead	Engineering Specifications Writer
UEG	Unit Environmental Guide
VLS	Vessel Logistics System
VTAG	Vibration Test and Analysis Guide

Appendix B

BMP Survey Team

Team Member	Activity	Function
Larry Robertson (812) 854-5336	Crane Division Naval Surface Warfare Center Crane, IN	Team Chairman
	Team 1	
Don Hill (317) 849-3202	BMP Field Office Indianapolis, IN	Team Leader
Bahadir Inozu (504) 280-7182	University of New Orleans New Orleans, LA	
	Team 2	
Stanley Green (909) 273-5429	Naval Surface Warfare Center Corona, CA	Team Leader
Michael Cisneros (909) 273-4992	Naval Surface Warfare Center Corona, CA	

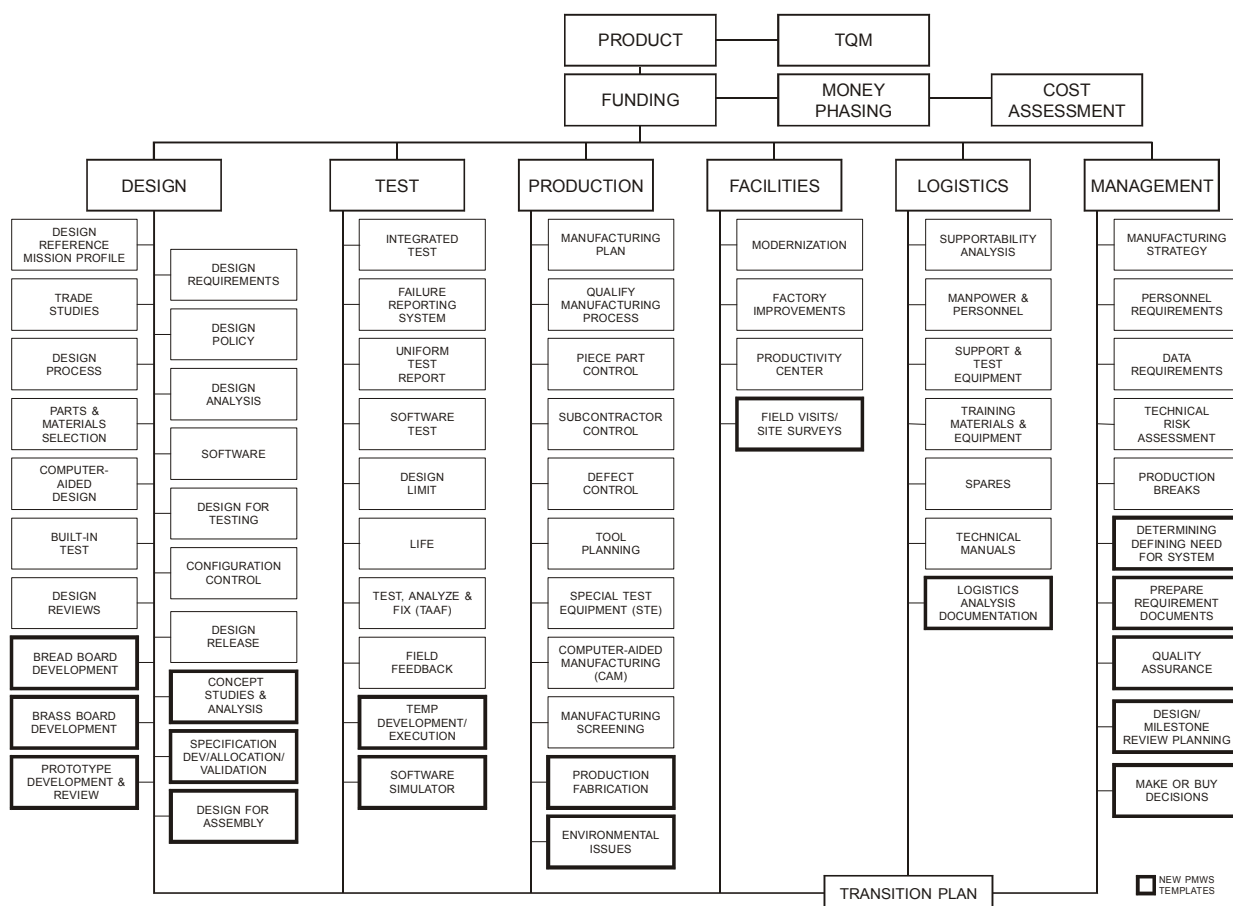
Appendix C

Critical Path Templates and BMP Templates

This survey was structured around and concentrated on the functional areas of design, test, production, facilities, logistics, and management as presented in the Department of Defense 4245.7-M, *Transition from Development to Production* document. This publication defines the proper tools—or templates—that constitute the critical path for a successful material acquisition program. It describes techniques for improving the acquisition process by addressing it as an *industrial* process that focuses on the product's design, test, and production phases which are interrelated and interdependent disciplines.

The BMP program has continued to build on this knowledge base by developing 17 new templates that complement the existing DOD 4245.7-M templates. These BMP templates address new or emerging technologies and processes.

“CRITICAL PATH TEMPLATES FOR TRANSITION FROM DEVELOPMENT TO PRODUCTION”



Appendix D

The Program Manager's WorkStation

The Program Manager's WorkStation (PMWS) is an electronic suite of tools designed to provide timely acquisition and engineering information to the user. The main components of PMWS are KnowHow; the Technical Risk Identification and Mitigation System (TRIMS); and the BMP Database. These tools complement one another and provide users with the *knowledge, insight, and experience* to make informed decisions through all phases of product development, production, and beyond.

KnowHow provides knowledge as an electronic library of technical reference handbooks, guidelines, and acquisition publications which covers a variety of engineering topics including the DOD 5000 series. The electronic collection consists of expert systems and simple digital books. In expert systems, KnowHow prompts the user to answer a series of questions to determine where the user is within a program's development. Recommendations are provided based on the book being used. In simple digital books, KnowHow leads the user through the process via an electronic table of contents to determine which books in the library will be the most helpful. The program also features a fuzzy logic text search capability so users can locate specific information by typing in keywords. KnowHow can reduce document search times by up to 95%.

TRIMS provides insight as a knowledge based tool that manages technical risk rather than cost and schedule. Cost and schedule overruns are downstream indicators of technical problems. Programs generally have had process problems long before the technical problem is

identified. To avoid this progression, TRIMS operates as a process-oriented tool based on a solid Systems Engineering approach. Process analysis and monitoring provide the earliest possible indication of potential problems. Early identification provides the time necessary to apply corrective actions, thereby preventing problems and mitigating their impact. TRIMS is extremely user-friendly and tailorable. This tool identifies areas of risk; tracks program goals and responsibilities; and can generate a variety of reports to meet the user's needs.

The **BMP Database** provides experience as a unique, one-of-a-kind resource. This database contains more than 2,500 best practices that have been verified and documented by an independent team of experts during BMP surveys. BMP publishes its findings in survey reports and provides the user with basic background, process descriptions, metrics and lessons learned, and a Point of Contact for further information. The BMP Database features a searching capability so users can locate specific topics by typing in keywords. Users can either view the results on screen or print them as individual abstracts, a

single report, or a series of reports. The database can also be downloaded, run on-line, or purchased on CD-ROM from the BMP Center of Excellence. The BMP Database continues to grow as new surveys are completed. Additionally, the database is reviewed every other year by a BMP core team of experts to ensure the information remains current.

For additional information on PMWS, please contact the Help Desk at (301) 403-8179, or visit the BMP web site at <http://www.bmpcoe.org>.



Appendix E

Best Manufacturing Practices Satellite Centers

There are currently ten Best Manufacturing Practices (BMP) satellite centers that provide representation for and awareness of the BMP Program to regional industry, government and academic institutions. The centers also promote the use of BMP with regional Manufacturing Technology Centers. Regional manufacturers can take advantage of the BMP satellite centers to help resolve problems, as the centers host informative, one-day regional workshops that focus on specific technical issues.

Center representatives also conduct BMP lectures at regional colleges and universities; maintain lists of experts who are potential survey team members; provide team member training; and train regional personnel in the use of BMP resources.

The ten BMP satellite centers include:

California

Chris Matzke

BMP Satellite Center Manager
Naval Surface Warfare Center, Corona Division
Code QA-21, P.O. Box 5000
Corona, CA 92878-5000
(909) 273-4992
FAX: (909) 273-4123
matzkecj@corona.navy.mil

Iowa

Bruce Coney

BMP Satellite Center Manager
Iowa Procurement Outreach Center
2273 Howe Hall, Suite 2617
Ames, IA 50011
(515) 294-4461
FAX: (515) 294-4483
bruce.coney@ciras.iastate.edu

District of Columbia

Chris Weller

BMP Satellite Center Manager
U.S. Department of Commerce
14th Street & Constitution Avenue, NW
Room 3876 BXA
Washington, DC 20230
(202) 482-8236/3795
FAX: (202) 482-5650
cweller@bis.doc.gov

Louisiana

Alley Butler

BMP Satellite Center Manager
Maritime Environmental Resources & Information Center
Gulf Coast Region Maritime Technology Center
University of New Orleans
UAMTCE, Room 163-Station 122
5100 River Road
New Orleans, LA 70094-2706
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3301 North Mulford Road
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Virginia**William Motley**

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Defense Acquisition University
9820 Belvoir Road, Suite G3
Ft. Belvoir, VA 22060-5565
(703)805-3763
FAX: (703)805-3721
bill.motley@dau.mil

Appendix F

Navy Manufacturing Technology Centers of Excellence

The Navy Manufacturing Technology Program has established Centers of Excellence (COEs) to provide focal points for the development and technology transfer of new manufacturing processes and equipment in a cooperative environment with industry, academia, and the Navy industrial facilities and laboratories. These consortium-structured COEs serve as corporate residences of expertise in particular technological areas. The following list provides a description and point of contact for each COE.

Best Manufacturing Practices Center of Excellence

The Best Manufacturing Practices Center of Excellence (BMPCOE) provides a national resource to identify and share best manufacturing and business practices being used throughout government, industry, and academia. The BMPCOE was established by the Office of Naval Research's BMP Program, the Department of Commerce, and the University of Maryland at College Park. By improving the use of existing technology, promoting the introduction of improved technologies, and providing non-competitive means to address common problems, the BMPCOE has become a significant factor to counter foreign competition.

Point of Contact:
Anne Marie T. SuPrise, Ph.D.
Best Manufacturing Practices Center of Excellence
4321 Hartwick Road
Suite 400
College Park, MD 20740
Phone: (301) 403-8100
FAX: (301) 403-8180
E-mail: annemari@bmpcoe.org

Institute for Manufacturing and Sustainment Technologies

The Institute for Manufacturing and Sustainment Technologies (iMAST) is located at the Pennsylvania State University's Applied Research Laboratory. iMAST's primary objective is to address challenges relative to Navy and Marine Corps weapon system platforms in the areas of mechanical drive transmission technologies, materials processing technologies, laser processing technologies, advanced composites technologies, and repair technologies.

Point of Contact:
Mr. Robert Cook
Institute for Manufacturing and Sustainment Technologies
APL Penn State
P.O. Box 30
State College, PA 16804-0030
Phone: (814) 863-3880
FAX: (814) 863-1183
E-mail: rbc5@psu.edu

SCRA Composites Manufacturing Technology Center

The Composites Manufacturing Technology Center (CMTC) is a Center of Excellence for the Navy's Composites Manufacturing Technology Program. The South Carolina Research Authority (SCRA) operates the CMTC and The Composites Consortium (TCC) serves as the technology resource. The TCC has strong, in-depth knowledge and experience in composites manufacturing technology. The SCRA/CMTC provides a national resource for the development and dissemination of composites manufacturing technology to defense contractors and subcontractors.

Point of Contact:
Mr. Henry Watson
SCRA Composites Manufacturing Technology Center
100 Fluor Daniel Engineering Building
Clemson, SC 29634-5726
Phone: (864) 656-6566
FAX: (864) 656-4435
E-mail: watson@scra.org

Electronics Manufacturing Productivity Facility

The Electronics Manufacturing Productivity Facility (EMPF) identifies, develops, and transfers innovative electronics manufacturing processes to domestic firms in support of the manufacture of affordable military systems. The EMPF operates as a consortium comprised of government, industry, and academic participants led by the American Competitiveness Institute under a Cooperative Agreement with the Navy.

Point of Contact:

Mr. Alan Criswell
Electronics Manufacturing Productivity Facility
One International Plaza, Suite 600
Philadelphia, PA 19113
Phone: (610) 362-1200
FAX: (610) 362-1294
E-mail: criswell@aci-corp.org

Electro-Optics Center

The Electro-Optics Center (EOC) is a national consortium of electro-optics industrial companies, universities, and government research centers that share their electro-optics expertise and capabilities through project teams focused on Navy requirements. Through its capability for national electronic communication and rapid reaction and response, the EOC can address issues of immediate concern to the Navy Systems Commands. The EOC is managed by the Pennsylvania State University's Applied Research Laboratory.

Point of Contact:

Dr. Karl Harris
Electro-Optics Center
West Hills Industrial Park
77 Glade Drive
Kittanning, PA 16201
Phone: (724) 545-9700
FAX: (724) 545-9797
E-mail: kharris@psu.edu

Navy Joining Center

The Navy Joining Center (NJC) provides a national resource for the development of materials joining expertise and the deployment of emerging manufacturing technologies to Navy contractors, subcontractors, and other activities. The NJC works with the Navy to determine and evaluate joining technology requirements and conduct technology development and deployment projects to address these issues. The NJC is operated by the Edison Welding Institute.

Point of Contact:

Mr. David P. Edmonds
Navy Joining Center
1250 Arthur E. Adams Drive
Columbus, OH 43221-3585
Phone: (614) 688-5096
FAX: (614) 688-5001
E-mail: dave_edmonds@ewi.org

National Center for Excellence in Metalworking Technology

The National Center for Excellence in Metalworking Technology (NCEMT) provides a national center for the development, dissemination, and implementation of advanced technologies for metalworking products and processes. Operated by the Concurrent Technologies Corporation, the NCEMT helps the Navy and defense contractors improve manufacturing productivity and part reliability through development, deployment, training, and education for advanced metalworking technologies.

Point of Contact:

Mr. Richard Henry
National Center for Excellence in Metalworking Technology
c/o Concurrent Technologies Corporation
100 CTC Drive
Johnstown, PA 15904-3374
Phone: (814) 269-2532
FAX: (814) 269-2501
E-mail: henry@ctc.com

Energetics Manufacturing Technology Center

The Energetics Manufacturing Technology Center (EMTC) addresses unique manufacturing processes and problems of the energetics industrial base to ensure the availability of affordable, quality, and safe energetics. The EMTC's focus is on technologies to reduce manufacturing costs, improve product quality and reliability, and develop environmentally benign manufacturing processes. The EMTC is located at the Indian Head Division of the Naval Surface Warfare Center.

Point of Contact:

Mr. John Brough

Energetics Manufacturing Technology Center

Indian Head Division

Naval Surface Warfare Center

100 Strauss Avenue

Building D326, Room 227

Indian Head, MD 20640-5035

Phone: (301) 744-4417

DSN: 354-4417

FAX: (301) 744-4187

E-mail: broughja@ih.navy.mil

Gulf Coast Region Maritime Technology Center

The Gulf Coast Region Maritime Technology Center (GCRMTC) fosters competition in shipbuilding technology through cooperation with the U.S. Navy, representatives of the maritime industries, and various academic and private research centers throughout the country. Located at the University of New Orleans, the GCRMTC focuses on improving design and production technologies for shipbuilding, reducing material costs, reducing total ownership costs, providing education and training, and improving environmental engineering and management.

Point of Contact:

Dr. John Crisp, P.E.

Gulf Coast Region Maritime Technology Center

University of New Orleans

College of Engineering

Room EN-212

New Orleans, LA 70148

Phone: (504) 280-3871

FAX: (504) 280-3898

E-mail: jcrisp@uno.edu

Appendix G

Completed Surveys

As of this publication, 128 surveys have been conducted and published by BMP at the companies listed below. Copies of older survey reports may be obtained through DTIC or by accessing the BMP web site. Requests for copies of recent survey reports or inquiries regarding BMP may be directed to:

Best Manufacturing Practices Program
4321 Hartwick Rd., Suite 400
College Park, MD 20740
Attn: Anne Marie T. SuPrise, Ph.D., Director
Telephone: 1-800-789-4267
FAX: (301) 403-8180
annemari@bmpcoe.org

1985	Litton Guidance & Control Systems Division - Woodland Hills, CA
1986	Honeywell, Incorporated Undersea Systems Division - Hopkins, MN (now Alliant TechSystems, Inc.) Texas Instruments Defense Systems & Electronics Group - Lewisville, TX General Dynamics Pomona Division - Pomona, CA Harris Corporation Government Support Systems Division - Syosset, NY IBM Corporation Federal Systems Division - Owego, NY Control Data Corporation Government Systems Division - Minneapolis, MN
1987	Hughes Aircraft Company Radar Systems Group - Los Angeles, CA ITT Avionics Division - Clifton, NJ Rockwell International Corporation Collins Defense Communications - Cedar Rapids, IA UNISYS Computer Systems Division - St. Paul, MN
1988	Motorola Government Electronics Group - Scottsdale, AZ General Dynamics Fort Worth Division - Fort Worth, TX Texas Instruments Defense Systems & Electronics Group - Dallas, TX Hughes Aircraft Company Missile Systems Group - Tucson, AZ Bell Helicopter Textron, Inc. - Fort Worth, TX Litton Data Systems Division - Van Nuys, CA GTE C ³ Systems Sector - Needham Heights, MA
1989	McDonnell-Douglas Corporation McDonnell Aircraft Company - St. Louis, MO Northrop Corporation Aircraft Division - Hawthorne, CA Litton Applied Technology Division - San Jose, CA Litton Amecom Division - College Park, MD Standard Industries - LaMirada, CA (now SI Manufacturing) Engineered Circuit Research, Incorporated - Milpitas, CA Teledyne Industries Incorporated Electronics Division - Newbury Park, CA Lockheed Aeronautical Systems Company - Marietta, GA Lockheed Missile Systems Division - Sunnyvale, CA (now Lockheed Martin Missiles and Space) Westinghouse Electronic Systems Group - Baltimore, MD (now Northrop Grumman Corporation) General Electric Naval & Drive Turbine Systems - Fitchburg, MA Rockwell Autonetics Electronics Systems - Anaheim, CA (now Boeing North American A&MSD) TRICOR Systems, Incorporated - Elgin, IL
1990	Hughes Aircraft Company Ground Systems Group - Fullerton, CA TRW Military Electronics and Avionics Division - San Diego, CA MechTronics of Arizona, Inc. - Phoenix, AZ Boeing Aerospace & Electronics - Corinth, TX Technology Matrix Consortium - Traverse City, MI Textron Lycoming - Stratford, CT

1991	<i>Resurvey of Litton Guidance & Control Systems Division</i> - Woodland Hills, CA Norden Systems, Inc. - Norwalk, CT (now Northrop Grumman Norden Systems) Naval Avionics Center - Indianapolis, IN United Electric Controls - Watertown, MA Kurt Manufacturing Co. - Minneapolis, MN MagneTek Defense Systems - Anaheim, CA (now Power Paragon, Inc.) Raytheon Missile Systems Division - Andover, MA AT&T Federal Systems Advanced Technologies and AT&T Bell Laboratories - Greensboro, NC and Whippany, NJ <i>Resurvey of Texas Instruments Defense Systems & Electronics Group</i> - Lewisville, TX
1992	Tandem Computers - Cupertino, CA Charleston Naval Shipyard - Charleston, SC Conax Florida Corporation - St. Petersburg, FL Texas Instruments Semiconductor Group Military Products - Midland, TX Hewlett-Packard Palo Alto Fabrication Center - Palo Alto, CA Watervliet U.S. Army Arsenal - Watervliet, NY Digital Equipment Company Enclosures Business - Westfield, MA and Maynard, MA Computing Devices International - Minneapolis, MN (now General Dynamics Information Systems) <i>(Resurvey of Control Data Corporation Government Systems Division)</i> Naval Aviation Depot Naval Air Station - Pensacola, FL
1993	NASA Marshall Space Flight Center - Huntsville, AL Naval Aviation Depot Naval Air Station - Jacksonville, FL Department of Energy Oak Ridge Facilities (Operated by Martin Marietta Energy Systems, Inc.) - Oak Ridge, TN McDonnell Douglas Aerospace - Huntington Beach, CA (now Boeing Space Systems) Crane Division Naval Surface Warfare Center - Crane, IN and Louisville, KY Philadelphia Naval Shipyard - Philadelphia, PA R. J. Reynolds Tobacco Company - Winston-Salem, NC Crystal Gateway Marriott Hotel - Arlington, VA Hamilton Standard Electronic Manufacturing Facility - Farmington, CT (now Hamilton Sundstrand) Alpha Industries, Inc. - Methuen, MA
1994	Harris Semiconductor - Palm Bay, FL (now Intersil Corporation) United Defense, L.P. Ground Systems Division - San Jose, CA Naval Undersea Warfare Center Division Keyport - Keyport, WA Mason & Hanger - Silas Mason Co., Inc. - Middletown, IA Kaiser Electronics - San Jose, CA U.S. Army Combat Systems Test Activity - Aberdeen, MD (now Aberdeen Test Center) Stafford County Public Schools - Stafford County, VA
1995	Sandia National Laboratories - Albuquerque, NM Rockwell Collins Avionics & Communications Division - Cedar Rapids, IA (now Rockwell Collins, Inc.) <i>(Resurvey of Rockwell International Corporation Collins Defense Communications)</i> Lockheed Martin Electronics & Missiles - Orlando, FL McDonnell Douglas Aerospace (St. Louis) - St. Louis, MO (now Boeing Aircraft and Missiles) <i>(Resurvey of McDonnell-Douglas Corporation McDonnell Aircraft Company)</i> Dayton Parts, Inc. - Harrisburg, PA Wainwright Industries - St. Peters, MO Lockheed Martin Tactical Aircraft Systems - Fort Worth, TX <i>(Resurvey of General Dynamics Fort Worth Division)</i> Lockheed Martin Government Electronic Systems - Moorestown, NJ Sacramento Manufacturing and Services Division - Sacramento, CA JLG Industries, Inc. - McConnellsburg, PA
1996	City of Chattanooga - Chattanooga, TN Mason & Hanger Corporation - Pantex Plant - Amarillo, TX Nascote Industries, Inc. - Nashville, IL Weirton Steel Corporation - Weirton, WV NASA Kennedy Space Center - Cape Canaveral, FL <i>Resurvey of Department of Energy, Oak Ridge Operations</i> - Oak Ridge, TN

1997	Headquarters, U.S. Army Industrial Operations Command - Rock Island, IL (now Operational Support Command) SAE International and Performance Review Institute - Warrendale, PA Polaroid Corporation - Waltham, MA Cincinnati Milacron, Inc. - Cincinnati, OH Lawrence Livermore National Laboratory - Livermore, CA Sharretts Plating Company, Inc. - Emigsville, PA Thermacore, Inc. - Lancaster, PA Rock Island Arsenal - Rock Island, IL Northrop Grumman Corporation - El Segundo, CA <i>(Resurvey of Northrop Corporation Aircraft Division)</i> Letterkenny Army Depot - Chambersburg, PA Elizabethtown College - Elizabethtown, PA Tooele Army Depot - Tooele, UT
1998	United Electric Controls - Watertown, MA Strite Industries Limited - Cambridge, Ontario, Canada Northrop Grumman Corporation - El Segundo, CA Corpus Christi Army Depot - Corpus Christi, TX Anniston Army Depot - Anniston, AL Naval Air Warfare Center, Lakehurst - Lakehurst, NJ Sierra Army Depot - Herlong, CA ITT Industries Aerospace/Communications Division - Fort Wayne, IN Raytheon Missile Systems Company - Tucson, AZ Naval Aviation Depot North Island - San Diego, CA <i>U.S.S. Carl Vinson (CVN-70)</i> - Commander Naval Air Force, U.S. Pacific Fleet Tobyhanna Army Depot - Tobyhanna, PA
1999	Wilton Armetale - Mount Joy, PA Applied Research Laboratory, Pennsylvania State University - State College, PA Electric Boat Corporation, Quonset Point Facility - North Kingstown, RI <i>Resurvey of NASA Marshall Space Flight Center</i> - Huntsville, AL Orenda Turbines, Division of Magellan Aerospace Corporation - Mississauga, Ontario, Canada
2000	Northrop Grumman, Defensive Systems Division - Rolling Meadows, IL Crane Army Ammunition Activity - Crane, IN Naval Sea Logistics Center, Detachment Portsmouth - Portsmouth, NH Stryker Howmedica Osteonics - Allendale, NJ
2001	The Tri-Cities Tennessee/Virginia Region - Johnson City, TN General Dynamics Armament Systems - Burlington, VT Lockheed Martin Naval Electronics & Surveillance Systems-Surface Systems - Moorestown, NJ Frontier Electronic Systems - Stillwater, OK
2002	U.S. Coast Guard, Maintenance and Logistics Command-Atlantic - Norfolk, VA U.S. Coast Guard, Maintenance and Logistics Command-Pacific - Alameda, CA